CITY OF IONE

WASTEWATER MASTER PLAN

DECEMBER 2, 2009

SUBMITTED TO CITY OF IONE
SUBMITTED BY

LEE & RO, Inc.

12/31/09
CIVIL

12/01/09

AND

PMC

TABLE OF CONTENTS

The following groups and individual are thanked for their assistance in the creation of this report: Mr. Don Myshrall, Building Official/Public Works Project Manager; Mr. Roark Weber, City Engineer; and Ms. Kimberly Kerr, City Manager. Their own and their staff's cooperation and courtesy in obtaining a variety of necessary information were valuable components in completing and producing this report.

ABBREVIATIONS

ADWF	average dry weather flow
ASCE	American Society of Civil Engineers
ARSA	Amador Regional Sanitation Authority
AWA	Amador Water Agency
BWF	base wastewater flow
CEQA	California Environmental Quality Act
CIP	capital improvement program
City	City of Ione
cfs	cubic feet per second
County	Amador County
COWRP	Castle Oaks Water Reclamation Plant
DOF	Department of Finance
EIR	Environmental Impact Report
ENR CCI	Engineering News Records Construction Cost Index
fps	feet per second
gpda	gallons per day per acre
gpdpc	gallons per day per capita
gpm/GPM	gallons per minute
GWI	groundwater infiltration
I/I	infiltration/inflow
LF	linear feet
MDWWF	maximum day wet weather flow
mgd/MGD	million gallons per day
PDWF	peak dry weather flow
PGA	peak ground acceleration

PWWF	peak wet weather flow
RDI/I	rainfall dependent infiltration & inflow
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
R-Value	percentage of rainfall volume
SOI	sphere of influence
WEF	Water Environment Federation
WDRs	Waste Discharge Requirements
WWTF/WWTP	Secondary Wastewater Treatment Plant

TERMS

Backwash Water. May be produced when raw water is used to wash filters and components of a water treatment plant.

Castle Oaks Water Reclamation Plant (COWRP). The City's tertiary WWTP.

City of Ione Wastewater Treatment Plant. The City's secondary wastewater treatment plant.

Disinfection. Can occur after final treatment but is not always required. Normally disinfection is accomplished with chlorine gas or a chlorine compound. Use of chlorine presents worker safety issues and chlorination of water may result in increased concentrations of trihalamethanes in the effluent. Trihalamethanes are believed to be a health risk to humans if ingested high enough concentrations and over a long period of time. Alternatively, disinfection can be accomplished using ultraviolet light. This method of disinfection eliminates the concern of trihalamethanes but does not provide a residual disinfection chemical concentration and regrowth of bacteria can potentially occur.

Preliminary Treatment. Consists of screening and grit removal for the protection of downstream piping, valves, and pumping equipment.

Primary Treatment. Consists of removal of suspended solids (SS) and reduction of Biological Oxygen Demand (BOD5) by sedimentation. Typically 60 percent of SS and 30 percent of the BOD5 can be removed through this process.

Secondary Treatment. Consists of biological treatment. This treatment method relies on bacteria to consume the organic material in the waste. This treatment removes 80-95 percent of remaining SS and BOD5. Secondary treatment can also include the removal of nitrogen compounds. Secondary treatment does not have to be proceeded by primary treatment.

Secondary Wastewater Treatment Plant. In Ione, also known as the City of Ione Wastewater Treatment Plant.

Tertiary Treatment. Consists of chemical precipitation and filtration. This process removes 80-95 percent the remaining contaminates. Tertiary treatment only occurs after secondary treatment.

Tertiary Wastewater Treatment Plant. In Ione, also known as the Castle Oaks Water Reclamation Plant (COWRP).

1.1 OBJECTIVE

The City of Ione (City) is currently near or at capacity for the treatment and disposal of wastewater. An expansion would be necessary to accommodate future planned growth and wastewater flows. The purpose of this Wastewater Treatment Plant Master Plan (Master Plan) is to provide the City with a document that addresses the City's wastewater needs and identifies activities and guidelines necessary to meet future wastewater treatment and disposal requirements through 2030, the planning horizon of the City's General Plan. The primary objectives of this Master Plan are to:

- Project future wastewater flows through year 2030;
- Summarize the existing wastewater treatment and disposal system and known deficiencies;
- Establish wastewater treatment and disposal design criteria;
- Evaluate and propose improvements that will meet future wastewater flows, while increasing treatment and disposal system reliability; and
- Provide a plan which accommodates the City's future wastewater flows and meets the City's goal of tertiary treatment of all municipal and Amador Regional Sanitation Authority (ARSA) effluent.

This Master Plan contains four (4) sections, followed by appendices that provide supporting documentation for the information presented throughout this report. The chapters are briefly described below:

Section 1: Introduction. This section presents the purpose and objectives of this Master Plan. Background information is also provided.

Section 2: Study Area Characteristics. This section discusses the study area location, including physical characteristics, land use classifications and historical and future population projections. Land use classifications and population projections are based on the most recent General Plan (2009), which provides guidance for forecasting wastewater flows and staging future wastewater system improvements.

Section 3: Existing Wastewater System. Overview of the City's existing wastewater system, the secondary wastewater treatment plant (WWTP) and tertiary WWTP are presented in this section.

Section 4: Planning Criteria. Basic criteria used in developing the proposed improvements discussed in this Master Plan, such as wastewater flow, organic loads and treatment and disposal capacity are discussed in this section.

Section 5: Evaluation and Proposed Improvements. Options for meeting future wastewater flows are outlined and evaluated in this section. These improvements are recommended based on the criteria discussed in Section 4. A recommended option based on the wastewater treatment and disposal requirements, regulatory requirements, cost effectiveness and operational reliability is also provided in this section.

1.2 BACKGROUND

The City of Ione owns and operates the wastewater collection system and WWTP that provides wastewater service to its residents. The WWTP operates under a Central Valley RWQCB Waste Discharge Requirements (WDR) Order No. 95-125 dated May 26, 1995. On July 11, 2003, a Cease and Desist Order (CDO) R5-2003-0108 from the RWQCB to the City required the submission of a Wastewater Master Plan by November 30, 2004. A copy of the CDO is included in **Appendix 7.1**. In response to this request, the City completed and submitted in November 2004 a Master Plan, which included a capacity evaluation and recommended improvements.

Following the submission of the Master Plan in late 2004, the City submitted a Report of Waste Discharge in June 2006 and a companion Initial Study/Mitigated Negative Declaration[1] in July 2006. The report and declaration recommended expansion of the existing secondary WWTP facility with the construction of new aerated treatment ponds new percolation ponds both at the existing treatment plant and north of Sutter Creek adjacent to the Castle Oaks Water Reclamation Plant. Concerns were than raised about the recommended project and level of detail of the corresponding environmental study. Further, on February 20, 2007 the RWQCB issued a letter stating that the Report of Waste Discharge was incomplete. A copy of the letter is contained in **Appendix 7.2**.

On October 4, 2007, the City prepared a Technical Memorandum (TM), which expanded the number of alternatives presented in the 2004 Master Plan. A copy of the TM is contained in **Appendix 7.3**. During the Ione Council Meeting on October 16, 2007, the TM was presented and publicly discussed. From this meeting, the Council decided that the new wastewater facilities would:

(1) Provide tertiary treatment of City municipal wastewater;

(2) Allow for growth within the City of Ione based upon the General Plan

(3) Allow for the treatment and disposal of ARSA secondary effluent;

(4) Continue water reclamation at the Castle Oaks Golf Course;

(5) Allow the continued use of percolation/storage ponds; and

(6) Encourage partnerships for regionalization of wastewater facilities.

Therefore, this Master Plan updates the City's earlier planning efforts previously discussed and presents and recommends future wastewater treatment and disposal options to meet the City's objectives, regulatory requirements, and growth in the community. The Master Plan also furthers the Regional Board's goals to provide for reclamation and recycling of treated wastewater, and regionalization of wastewater treatment services.

This proposed Master Plan is based on anticipated demands resulting from projected growth in the City, as reflected in the City's General Plan. The City acknowledges, however, that wastewater demands could change based on future potential agreements to provide wastewater service to other dischargers in the region, including, but not limited to, Mule Creek

[1] According to California Environmental Quality Act, a Negative Declaration report is a document that describes the proposed project, presents the findings, and states the reasons why the project will not have a significant effect on the environment.

State Prison, Preston Youth Authority, Cal Fire Academy, and other communities in Amador County. Nothing in this Master Plan is intended to preclude such future potential agreements, so long as the City maintains treatment and disposal facilities to meet the objectives of this Master Plan.

In compliance with the California Environmental Quality Act (CEQA), an accompanying Environmental Impact Report (EIR) will analyze the environmental impacts associated with this Master Plan's recommended project and offer mitigation measures, if required.

2.1 STUDY AREA

The City of Ione is located in the western foothills of the Sierra Nevada Mountains in Amador County, California. The terrain in and around the City of Ione is characterized predominantly by gently rolling hills. Two state highways pass through the City of Ione, intersecting in the downtown commercial district. Highway 124 travels generally southwest to northeast through Ione, while Highway 104 travels generally southeast to northwest. The southern and more developed portion of the City is bisected east to west by Sutter Creek. Nearby communities include Clay to the west, Clements and Wallace to the south, and the Cities of Jackson, Sutter Creek, and Amador City to the east and northeast. The City of Sacramento is located approximately 40 miles to the northwest of the City of Ione. See Figure 2.1-1 (Proposed Project Location and Surrounding Vicinities).

The City of Ione's wastewater service area is divided by Sutter Creek with approximately 450 acres on either side of the creek. The service area consists of the resident population and a small number of commercial customers, but not the inmates and wards of the Mule Creek State Prison or the Preston Youth Correctional Facility. The main section of "Old" Ione is located generally east of the WWTP and south of Sutter Creek. The wastewater service area consists primarily of residential uses, as well as the main commercial area of the City, including retail shops, restaurants, and City Hall.

2.2 PHYSICAL ENVIRONMENT

TOPOGRAPHY

The City of Ione is situated on gentle slopes at the easterly end of the Ione Valley between elevations 270 and 350 feet. Sutter Creek is the principal drainage running from east to west through the valley.

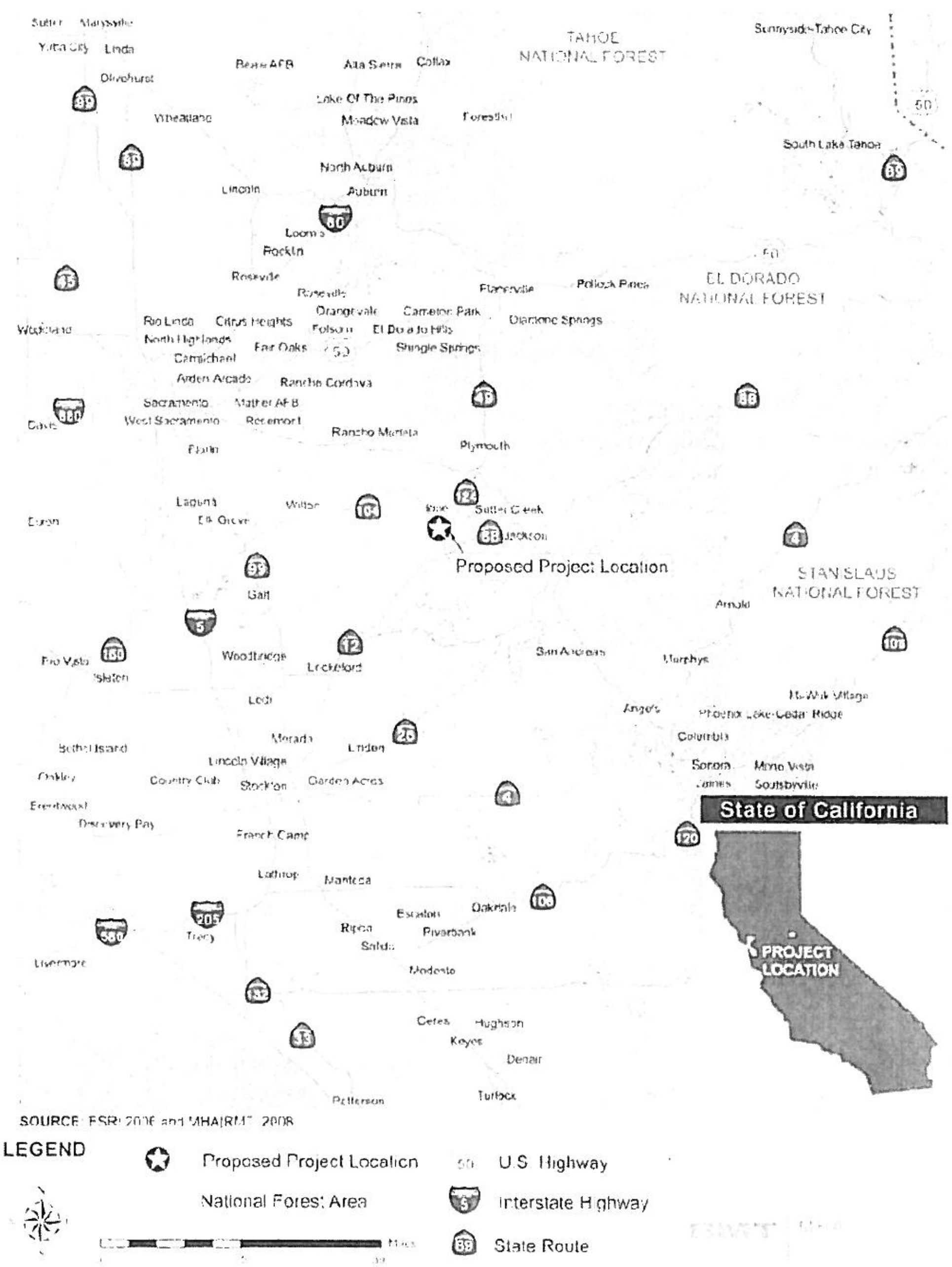
The rugged hilly land around Ione will probably preclude significant development beyond that which currently exists in the easterly and southerly portions of the current sphere of influence (SOI). Much of the currently planned and anticipated development in Ione is expected in the flatter valley bottomland west of the existing community.

CLIMATE

The climate in Ione is hot and dry in the summer and mild and wet in the winter. Average annual rainfall is approximately 22 inches, falling primarily between November and April. Prevailing winds are generally from the west.

Climate conditions are very nearly ideal for land disposal of wastewater by crop irrigation. The growing season extends from the beginning of March to the beginning of December. This led in the past to an agreement between the Amador Regional Sanitation Authority (ARSA) and the State of California for wastewater disposal by pasture crop irrigation on 237 acres of land owned by the State, but within the City limits. In the 1990s the ARSA began conveying treated secondary effluent via a series of canals and pipes through Henderson and Preston Reservoirs to these fields where the effluent was used to irrigate crops. With the development of the Castle Oaks Area this disposal option is no longer available and ARSA now has an agreement with the City to dispose of their treated secondary effluent.

FIGURE 2.1-1: PROPOSED PROJECT LOCATION AND SURROUNDING VICINITIES



HYDROLOGY

Stream courses through the Ione Valley run generally to the southwest from the foothills to the Central Valley. The major stream flows in the vicinity of Ione are Sutter Creek, which runs through the center of town and Mule Creek, located at the western city limits. Both flow into Dry Creek west of the City which eventually drains into the Mokelumne River. The hilly area south of the City, but within the SOI drains westerly and directly into Dry Creek.

Most minor drainages around Ione are tributary to Sutter Creek with the exception of those emanating from the Preston Reservoir area and portions of the Castle Oaks Golf Course and Subdivision. These generally drain into Mule Creek. Both Sutter Creek and Mule Creek are intermittently dry in the summer months.

Beneficial uses of Sutter Creek immediately downstream from the City are agricultural irrigation, recreation, and aesthetic enjoyment. The Central Valley RWQCB, charged with enforcing water quality standards in the area, has placed restrictions prohibiting discharge into the creeks to preserve water quality. Additionally, the State monitors development projects through the environmental review process to eliminate the possibility of pollution due to local runoff.

The current quality of surface waters in the study area is not well documented. Tests conducted in 1984 as part of a wastewater service analysis for the Mule Creek State Prison project identified that low flow quality of Sutter Creek water west of Ione may be impacted by adjacent land uses, including cattle grazing. Analysis of water in the creek has been performed by the City and reported to the RWQCB since 1997. Prior to 2001, this analysis consisted solely of electrical conductivity (EC). The RWQCB has cited some evidence of elevated EC downstream of the secondary WWTP, however, additional sampling and analysis has been inconclusive.

GROUNDWATER

Groundwater in the Ione Valley is used for agricultural purposes and, to a much lesser extent, for domestic water supply. Previous studies have found that groundwater is typically shallow (less than 100 feet), of limited available capacity, and of marginal quality. Wastewater disposal to land has been practiced in the valley by the State (Preston Youth Correctional Facility), the City and ARSA for many years.

Deep ruts in the Sutter Creek streambed appear to intersect the groundwater table resulting in stable pools of water just below the general streambed elevation long after surface flow in the stream channel has ceased. The relatively shallow groundwater table is demonstrated by a relatively shallow pond dug into the valley floor at the southeast corner of the City WWTP site from which groundwater has historically been extracted for agricultural irrigation purposes.

Due to topography and hydrology of Sutter Creek and Ione Valley, it is expected that some Sutter Creek water infiltrates into the Ione Valley groundwater in winter/spring to recharge the groundwater removed by wells over the previous irrigation season. This infiltration phenomenon is evident at the upstream end of Ione Valley even during summer. Intermediately during the dry season there is standing water and flow in Sutter Creek. This water is absorbed by valley sediments and flows subsurface towards the outlet of Ione Valley. If wells are extracting water from the Ione Valley aquifer, then this subsurface flow replaces the net loss of water (primarily agricultural evapotranspiration) resulting from groundwater extraction.

The shallowness of groundwater in Ione Valley and its connection to Sutter Creek are important concepts in understanding groundwater movement in the vicinity of the City's WWTP (ECO:LOGIC Engineering June 2006).

GEOLOGY AND SOILS

The Ione area is divided between two geomorphic provinces, the Sierra Nevada section to the east and the Great Valley of California to the west. These features were created by a series of geologic events over millions of years. Mineral resources, the products of Ione's geologic history, have played an important role in the City's development.

Gold found in and along stream channel in the mid-1800s and copper mined from the hills east of Ione through the 1900s were the principal metallic ores of significance in the area.

Underlying the valley is the Ione formation of clay, sand and conglomerates created by erosion of materials from the Sierra Nevada Mountains and subsequent sedimentation and consolidation in the marine environment that existed millions of years ago in the Eocene geologic period. The 400 foot thick formation has been commercially mined since the mid-1800s for clay and lignite, and more recently for glass and sand.

Surface soils overlying the Ione formation consist in the hilly areas generally of shallow gravelly clay loam layers of moderate to low permeability. In the valley bottomlands, somewhat deeper sections of sandy, silt, and clay loam soils predominate and demonstrate moderate permeability.

Surface permeability and depth to the relative impervious consolidated clays are key factors influencing the potential for wastewater disposal to land.

The existing secondary WWTP is situated on quaternary alluvium of the Modesto-Riverbank formation that has been deposited on the Ione formation(?). The soils are mapped as Honcut very fine(?) sandy loam on Honcut loam over clay. The soils are not expansive.

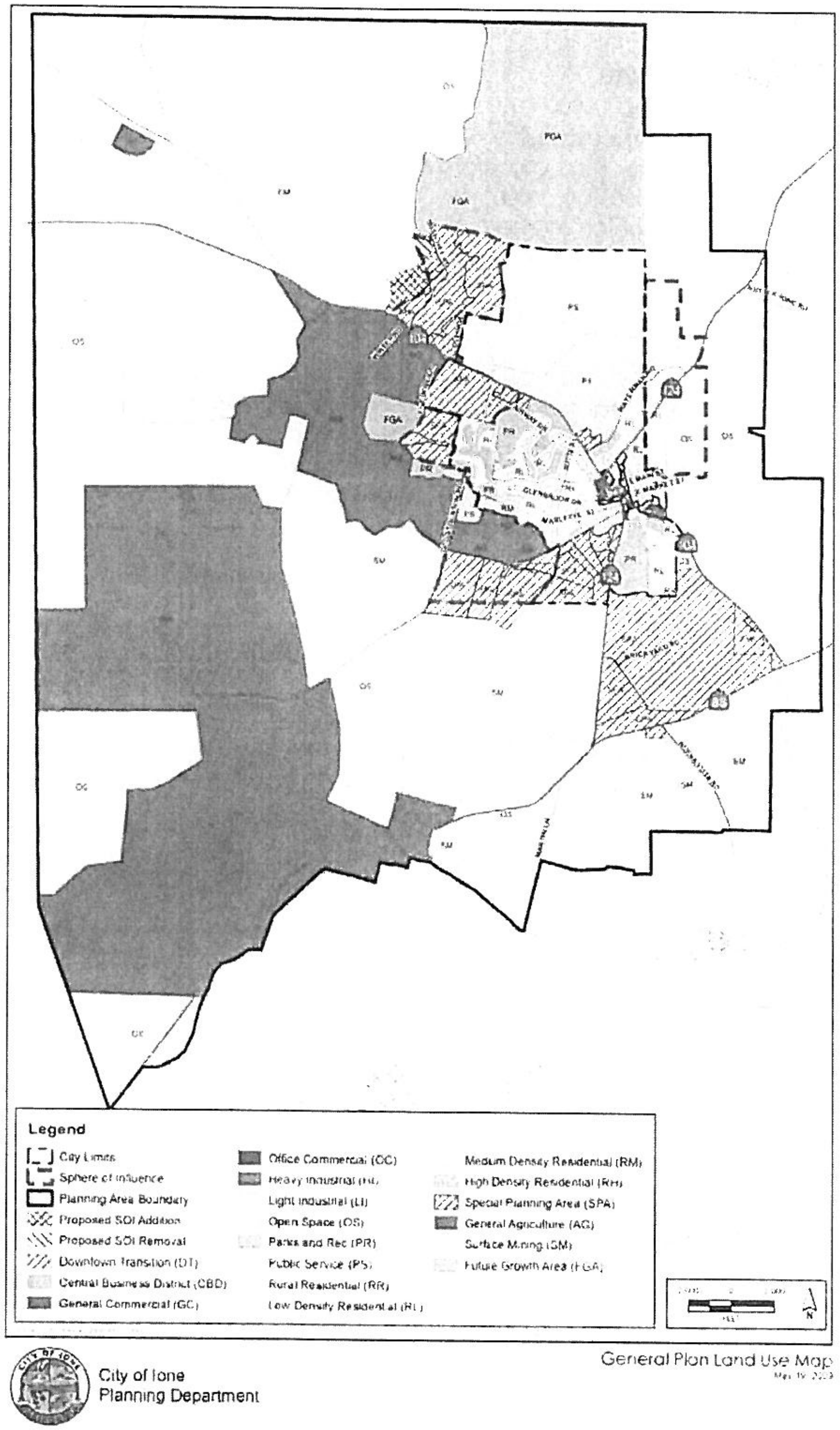
There are no faults mapped on the Alquist-Priolo Earthquake zoning maps near the site. Wallace and Kuhl reported a segment of the foothills fault system is located approximately one mile east of the site, which is capable of producing a 6.5 magnitude quake. Their further analysis indicated a 10 percent probability that peak ground acceleration (pga) of the area could exceed 0.14 times the acceleration due to gravity (0.14g) within the next 50 years. The California Geological Society reports the same probability for a pga of 0.15g on soft alluvium in the area. These values are indicative of relatively moderate to low ground shaking. Previous slope stability analysis at the site indicated factors of safety considered stable, except for the stream bank. They further concluded that failure of the stream bank would not impact the WWTP ponds (ECO:LOGIC Engineering June 2006).

2.3 LAND USE

The City of Ione's General Plan was adopted in 2009. The General Plan provides policies that guide the land use development of Ione. Figure 2.3-1 (Planning Areas and General Plan Land Use Designations) reflects the most recent General Plan land use designations and planning boundaries.

In the past eighteen years, the City has experienced increased development, evidenced by the approval and construction of the Castle Oaks Golf Subdivision and Golf Course in the 1990s. This area continues to build out by adding connections to the wastewater system. Future growths anticipated in the near term, as well as projections for the next 30 years, are included in Section 2.4 (Historical and Future Growth).

FIGURE 2.3-1: PLANNING AREAS AND GENERAL PLAN LAND USE DESIGNATIONS



The City has a central business district comprised of various retail and office uses. While no industrial uses currently exist within the city limits, two mining companies, Unimin Mine and Ione Minerals lease property for mining operations to the immediate south of the City of Ione.

2.4 HISTORICAL AND FUTURE GROWTH

The population of Ione was estimated to be 6,280 at the end of 1990, approximately 4,240 of which were confined to group quarters associated with State facilities (Mule Creek State Prison and Preston Youth Correctional Facility). As of July 1, 2003, the U.S. Census Bureau estimated the population of Ione to be 7,514, which includes the inmates at the Mule Creek State Prison and the wards at the Preston Youth Correctional Facility. Based on historical data, the population growth from 1990 to 2000 was approximately 0.45 percent. Existing commercial development is primarily located in the downtown area and consists of office and retail development totaling to approximately 110,000 square feet.

The 2009 General Plan estimates that the population in Ione will reach 17,258 by the year 2030, excluding population at State facilities. This population corresponds to roughly 7,125 single and multi-residential units. In addition, the General Plan projects a growth in commercial and industrial development. Presented in Table 2.4-1 (General Plan Development by 2030) is the growth development by 2030 as presented in the General Plan.

TABLE 2.4-1: GENERAL PLAN DEVELOPMENT BY 2030

Description	Total Development	Resident Population
Single Family Units	5,688	15,016
Multi-Family Units	1,437	2,242
Commercial, square feet	8,515,175	-
Industrial, square feet	10,468,121	-

The projection shown in the table above assumes very rapid growth especially for commercial and industrial development. This development is based upon City zoning and does not necessarily reflect the actual development that will occur in the next twenty years. As a result this Master Plan will look at a reduced rate of development based upon annual growth of 5 percent which is significantly greater than historical growth. Presented in Table 2.4-2 (Master Plan Development by 2030) are the revised growth projections based on the reduced rate of development. City intends to provide the maximum amount of flexibility in wastewater service planning and may increase or decrease the rate of development so long as the overall wastewater service is adequate.

TABLE 2.4-2: MASTER PLAN DEVELOPMENT BY 2030

Description	Total Development	Resident Population
Single Family Units	4,151	10,959
Multi-Family Units	541	844
Commercial, square feet	1,770,000	-
Industrial, square feet	1,460,000	-

STATE OF CALIFORNIA OPERATED FACILITIES

Mule Creek State Prison, Preston Youth Correctional Facility, and the CDF Forest Academy are institutions located within the City Limits of Ione, run by the State of California and served primarily by separate collection, treatment, and disposal systems. The population of these facilities is not included in the estimates for growth in this document. The long-term feasibility of combining/sharing wastewater facilities with some or all of these State-run institutions is being evaluated. With the exception of the CDF facility, the Mule Creek State Prison and Preston Youth Correctional Facility are not being considered in this Master Plan. However, nothing in this Master Plan is intended to preclude future potential agreements for the City to provide wastewater service to these and other wastewater sources in the region, consistent with state policies to encourage regionalization of wastewater treatment and disposal.

3.1 EXISTING WASTEWATER FACILITIES OVERVIEW

The City of Ione currently operates two wastewater treatment and disposal facilities, the City of Ione WWTP and the Castle Oaks Water Reclamation Plant (COWRP). The City of Ione WWTP, otherwise known as the City secondary WWTP is located directly south of Sutter Creek at the corner of Marlette Street and Old Stockton Road. The original facility was constructed in 1958 and modified and expanded multiple times in succeeding years. The City's wastewater, as well as the backwash water from the Ione Water Treatment Plant owned and operated by Amador Water Agency (AWA) is treated at the secondary WWTP.

The second wastewater facility is the COWRP, otherwise known as the City tertiary WWTP. The tertiary WWTP treats wastewater to Title 22 Standards before it is used for irrigation at the Castle Oaks Golf Course. The tertiary WWTP is located approximately 600 feet to the northwest of the City's secondary WWTP, across Sutter Creek. The tertiary plant serves ARSA, wastewater from the communities of Sutter Creek, Amador City, and portions of Martell, as well as a portion of flow from the Mule Creek State Prison per an agreement with ARSA and the City. Wastewater from ARSA is sent from the City of Sutter Creek's secondary WWTP in the north to the Henderson Reservoir and then to the Preston Reservoir where it combines with secondary treated wastewater from Mule Creek State Prison. From the Preston Reservoir, the secondary treated wastewater either travels to the City tertiary WWTP for tertiary treatment and land disposal on the Castle Oaks Golf Course or is sent to the City secondary WWTP percolation ponds. Additional discussion is contained in the following paragraphs.

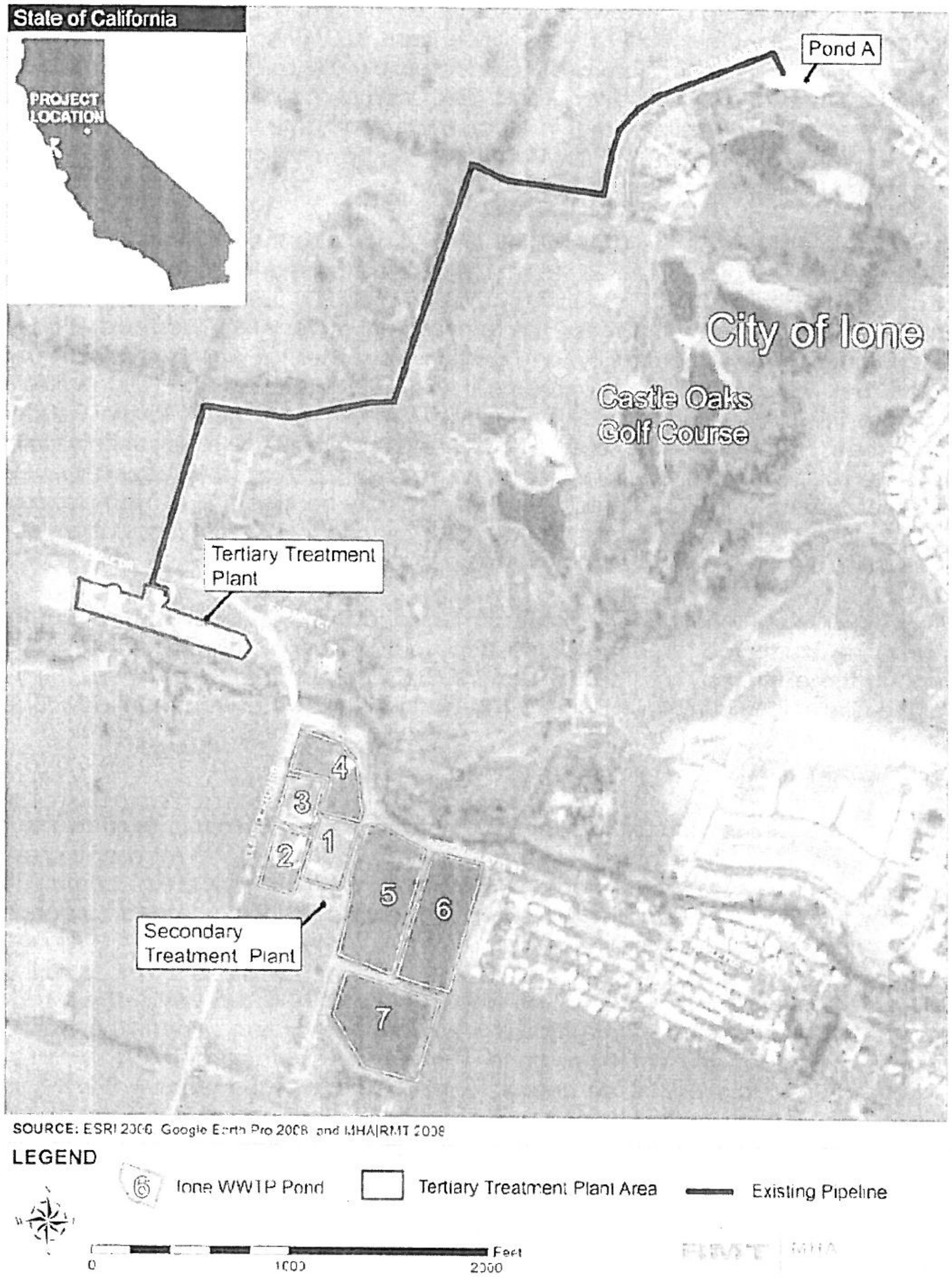
Figure 3.1-1 (Existing City of Ione Wastewater Treatment and Disposal Facilities) is an illustration showing the existing wastewater treatment and disposal facilities for the City of Ione. A flow diagram showing the existing sources and treatment and disposal processes for wastewater in the region of the City of Ione is shown in Figure 3.1-2 (Existing Wastewater Treatment Flow Chart).

3.2 CITY'S SECONDARY WWTP

Wastewater enters the City secondary WWTP at the headworks where flow is diverted into one (or both) of two open concrete channels. In the channel, a portion of the sand and gravel in the wastewater is removed via gravel traps. Downstream of the channel are communitors, which grinds and shreds any solids. The untreated wastewater is then pumped to ponds for further treatment and disposal.

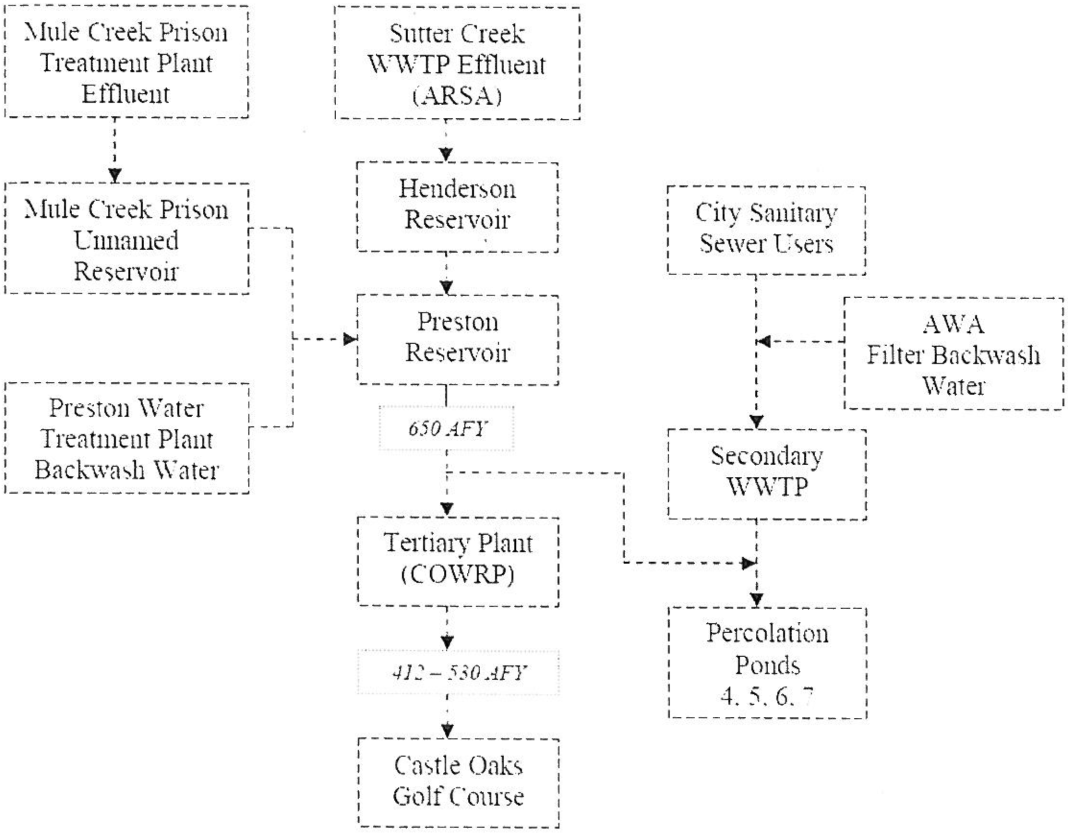
There are a total of seven ponds. Four of the ponds (Ponds 1 – 4) are aerated wastewater treatment ponds and the remaining three (Ponds 5 – 7) are percolation ponds. The untreated wastewater from the headworks arrives at Pond 1 where two surface aerators supplies the required oxygen required to produce an aerobic zone. Gradually, the wastewater moves to Pond 2, where oxygen is also supplied by one surface aerator. The aerators in Pond 3 and Pond 4 help to maintain a minimum dissolved oxygen concentration. By Pond 4, the wastewater has completed its cycle and is considered secondary treated wastewater that is in compliance with regulations for effluent evaporation and percolation.

FIGURE 3.1-1: EXISTING CITY OF IONE WASTEWATER TREATMENT AND DISPOSAL FACILITIES



SOURCE: ESRI 2006, Google Earth Pro 2008 and MHA|RMT 2008

FIGURE 3.1-2: EXISTING WASTEWATER TREATMENT FLOW CHART



Note: A volume of one million gallons is equivalent to 3.07 acre-feet (AF)

The three remaining ponds (Ponds 5 – 7) are percolation ponds, which use a combination of evaporation and percolation to provide final treatment and disposal of the secondary treated wastewater. Pond 5 receives secondary treated wastewater. Pond 6 is typically only utilized for ARSA wastewater during the wet months of the year when the Castle Oaks Golf Course does not require irrigation, however during the dry months, the ARSA wastewater is sent to the City tertiary WWTP for tertiary treatment and disposed as irrigation water for the golf course. The final pond, Pond 7 was intended to accommodate excess wastewater from Ponds 5 and 6. Since the secondary WWTP is currently at or near capacity, Pond 6 and sometimes Pond 7 may contain treated secondary wastewater throughout the year and not just during the wet months. Additional discussion concerning the secondary WWTP facilities, capacity, and operation are contained in Technical Memorandum dated May 4, 2007 provided in **Appendix 7.4**.

EXISTING WASTEWATER FLOWS AND LOADS

The existing wastewater flow and load conditions at the secondary WWTP are provided in Table 3.1-1 (Existing Wastewater Flow). The hydraulic, treatment and disposal capacity of the City's secondary WWTP is a maximum of 0.55 MGD for average dry weather flow conditions.

TABLE 3.1-1: EXISTING WASTEWATER FLOW[1]

Condition	Flow (MGD)
Average Dry Weather Flow (ADWF)	0.41
Maximum Daily Flow	0.75
Peak Hourly Flow	1.60

Components contributing to the existing dry weather wastewater flow consist of residential wastewater, limited commercial development from the downtown area of Ione, groundwater infiltration, and a single industrial user, AWA. AWA operates the Ione Water Treatment Plant (IWTP) and discharges backwash water from the plant's filters to the City sanitary sewer system on a daily basis. The backwash water averaged approximately 87,000 gallons per day (gpd) in 2007. However, due to changes in operations the backwash water volume is currently around 30,000 gpd. While historical backwash water volume represents approximately 20 percent of the volumetric portion of the total wastewater treated at the City's secondary WWTP, it is not a strong waste stream (no appreciable BOD_5 loading). A summary of the components contributing to the existing wastewater flow is estimated as follows for the ADWF condition (Table 3.1-2: Existing Wastewater Flow Components):

TABLE 3.1-2: EXISTING WASTEWATER FLOW COMPONENTS[1]

Wastewater Flow Source	Flow (MGD)
Municipal (residential and commercial)	0.32
AWA Backwash (industrial discharge)	0.09
Total (ADWF Condition)	0.41

Flows have decreased since 2004 and average flow measured from July through October 2009 is 0.36 MGD. In addition to flow, organic and solids loading is another principal design criteria. Existing organic and solids loading conditions at the City's secondary WWTP are provided in the following Table 3.1-3 (Existing Wastewater Concentration and Loading).

[1] Source: ECO:LOGIC 2004 Master Plan Table 4-1

TABLE 3.1-3: EXISTING INFLUENT WASTEWATER CONCENTRATION AND LOADING – JULY-OCTOBER 2009

Condition	Concentration (mg/L)	Loading (lbs/day)
Biochemical Oxygen Demand (BOD_5)	281	832
Suspended Solids (SS)	247	731

Biochemical oxygen demand and suspended solids concentrations in Table 3.1-3 (Existing Wastewater Concentration and Loading) were measured from July through October 2009. BOD and TSS concentrations measured July through October 2009 are higher than historically measured from 2002 through 2008.

EXISTING DISPOSAL CAPACITY

Currently, wastewater from ARSA is sent from the City of Sutter Creek's secondary WWTP in the north to the Henderson Reservoir and then to the Preston Reservoir where it combines with secondary treated wastewater from Mule Creek State Prison. From the Preston Reservoir, the secondary treated wastewater either travels to the City's tertiary WWTP for tertiary treatment and land disposal on the Castle Oaks Golf Course or is sent to the City's secondary WWTP percolation ponds. Current disposal capacity of the entire pond system, Ponds 1 through 7, including evaporation is approximately 0.85 MGD.

In the fall of 2007, the City of Ione entered into a three party agreement with the State of California and ARSA. This agreement replaced an earlier court settlement between ARSA and the City in 1990 and subsequent amendments, the most recent of which was in 2004. The significant impact of the 2007 agreement is that the disposal of ARSA wastewater to the City's secondary WWTP percolation ponds was reduced from their current obligation of 900 acre-feet per year (AFY) to a maximum 650 AFY (0.58 MGD), a reduction of 250 AFY. Wastewater from Mule Creek State Prison is included in the 650 AFY limit.

The Central Valley RWQCB issued Cease and Desist Order No. R5-2003-0108 on July 11, 2003, due to concern that seepage of subsurface water observed along the southern back of Sutter Creek may be effluent from the City's secondary WWTP percolation ponds. In order to remediate the potential contamination of Sutter Creek from the secondary-treated wastewater in the nearby percolation ponds, the City submitted a 2004 Facility Guidance Document to the RWQCB. This document proposed the lining of any ponds within 200 feet of Sutter Creek as a means to comply with the Cease and Desist Order and to avoid imposition of a National Pollutant Discharge Elimination System (NPDES) permit on the potential seepage. RWQCB has not accepted this proposed mitigation and has requested additional hydrogeologic investigation. This investigation is being performed as part of the companion EIR to this Master Plan. The EIR will evaluate and determine existing impacts, if any, and the appropriate mitigations. For planning purposes, closure of Ponds 1-4 and filling of the northern 200 feet of Ponds 5 and 6 has been assumed. Shown in Table 3.1-4 (Existing Percolation Pond Capacities and Character tics) are the areas, storage volume, and disposal capacity of existing Percolation Ponds 5, 6, and 7. The existing secondary treatment plant water balance for a 100 year precipitation occurrence is contained in **Appendix 7.5**.

TABLE 3.1-4: EXISTING PERCOLATION POND CAPACITIES AND CHARACTERISTICS

Condition	Units	Existing Ponds 5, 6 and 7
Disposal Capacity (Annual)	MGD	0.60
Gross Area	acres	18.2
Water Surface	acres	14.4
Bottom Surface	acres	10.5
Maximum Water Depth	feet	8 to 14
Storage Volume	million gallons	38.5

3.3 CITY'S TERTIARY WWTP

The COWRP is located on Five Mile Drive, north of Sutter Creek. Tertiary water from the plant is delivered to the 18-hole Castle Oaks Golf Course (approximately 200 acres) for landscape irrigation and use in a series of decorative ponds. COWRP provides all the water for the golf course during the dry season and does not operate continuously.

COWRP is allowed to use reclaimed water (Title 22) for irrigation purposes by the State of California under jurisdiction of the Central Valley RWQCB and permitted by Water Reclamation Requirements (WRR) 93-240. COWRP has a permitted capacity of 1.2 MGD, which is roughly equal to the peak seasonal irrigation demand of the Castle Oaks Golf Course. Major components of the COWRP are summarized below. Basic design criteria for the tertiary treatment plant are presented in **Appendix 7.6**.

- Tertiary Flocculation/Headworks (sized for a peak hydraulic capacity of 1.9 MGD with average flows of 1.2 MGD)
- Tertiary Sand Filters (four filter cells with a total loading capacity of 2.5 MGD)
- Chlorine Mix Tank and Contact Basin (total capacity of 200,000 gallons and a detention time of 120 minutes at a design flow of 1.2 MGD)
- Effluent Pump Station (two vertical turbine pumps that deliver reclaimed water to Pond A at the Castle Oaks Golf Course and two plant water pumps that supply plant water and filter backwash water)
- Solids Handling Facility (drying and storage area for solids produced during the tertiary treatment process)
- Electrical Service (400 amp service)
- Control and Chemical Building

- Chemical Storage (storage tanks for sodium hypochlorite and polymer)
- Sewerage Lift Station and Forcemain, Maintenance Building, and Storage Area (these facilities are located on the site of the tertiary WWTP, but are not part of the function of the facility)

Currently the COWRP is not able to accept treated secondary effluent from the City. Instead the treatment plant treats raw water and secondary effluent from the ARSA system.

Basic criteria used in developing the Master Plan improvements are identified in this section.

4.1 PROJECTED WASTEWATER FLOWS AND LOADS

As discussed in Section 2, this Master Plan will project wastewater flow to 2030 based on a reduced commercial and industrial development from the General Plan.

As of July 2007, the City had a service obligation of 1275 sewer connections, which increased to approximately 1525, as of June 2009. These connections are primarily single family residences, but include some multi-family and commercial (retail and office) connections. The City has further issued "notices of service" for an additional 1000 un-built single family residences.

Shown in Table 4.1-1 (Wastewater Flow Projection Criteria) are the estimated wastewater flows per development type that will be used to estimate future wastewater flows. Flow for commercial and industrial development as shown in the table is an allowance based upon the development square footage. Some types of development such as storage warehouse may result in substantially less flow, while other developments , such as wet industries (i.e. food processing) create greater flow. Therefore, careful planning and onsite pretreatment should be considered before project approval. Based on future flow projections, significant industrial and commercial development is assumed to start in 2014. Capacity has been reserved for significant industrial and commercial development on the assumption that the City would provide "will serve" notices immediately upon completion of the new treatment facilities.

TABLE 4.1-1: WASTEWATER FLOW PROJECTION CRITERIA

Type of Development	Average Flow
Single Family Residence (gpd)	200
Multi –Family Residence (gpd)	150
Commercial (Retail and Office) Development (gallon per square foot per day)	0.1
Industrial Development (gallon per square foot per day)	0.1

Backwash water from the Ione Water Treatment Plant is treated at the City's secondary WWTP. AWA has verbally informed the City that they intend to stop all backwash water flows to the secondary WWTP within the next two years (2011). However, there is no signed agreement stating a specific termination date and the City currently has no guarantee that the backwash water discharged to the sewer system will be terminated. Therefore, treatment capacity for AWA was included in the future flow projections.

Initial discussions with the CDF Fire Academy to provide wastewater service for the training facility have been conducted. CDF Fire Academy wants to construct new dorms at the training facility. The academy currently receives wastewater treatment services from the Mule Creek Prison and no additional capacity is available. Therefore, capacity for the academy was included in the future flow projections starting in 2012.

The City also has discussed with the State of California the treatment of wastewater from the Preston Youth Correctional Facility and Mule Creek State Prison. Wastewater requirements and impacts for providing service to these two State facilities were not considered in this Master Plan. However, nothing in this plan precludes the City from accepting wastewater, or treated wastewater, from these two State facilities. If such flows are added to the City's wastewater system, additional treatment and/or disposal capacity may be required. In addition, if any other sources of wastewater are delivered to the City, additional treatment and disposal capacity would be required.

Table 4.1-2 (Future Wastewater Service Obligation Assumptions) summarizes the City's future wastewater obligations used to develop the wastewater flow projections to 2030.

TABLE 4.1-2: FUTURE WASTEWATER SERVICE OBLIGATIONS ASSUMPTIONS

Description	Obligation
Residential, Commercial, and Industrial Development	5 Percent Annual Growth
California Fire Academy	14,000 gpd
Commercial Development 2014 "will serve"	700,000 square feet
Industrial Development 2014 "will serve"	850,000 square feet
AWA Backwash Water	50,000 gpd

Table 4.1-3 (Future Hydraulic Peaking Factors) provides future peaking factors for the treatment facility. These factors are multiplied by the flow condition to obtain the peak flow.

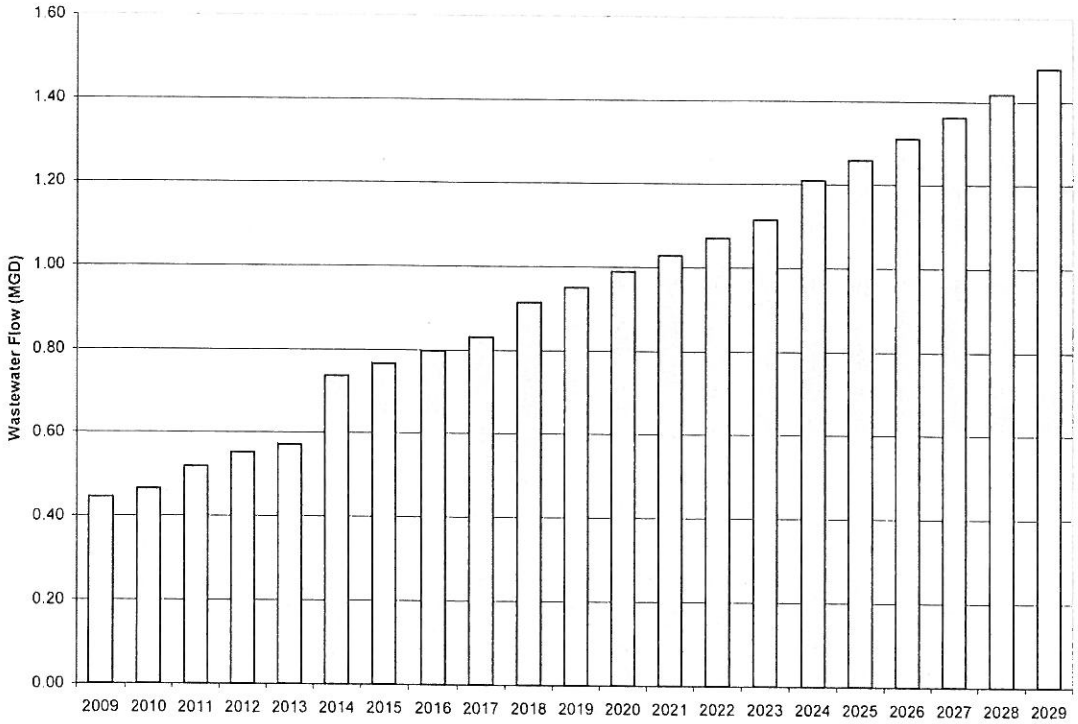
TABLE 4.1-3: FUTURE HYDRAULIC PEAKING FACTORS

Condition	Factor
Maximum Daily Flow	1.9 times ADWF
Peak Hourly Flow	2.5 times ADWF
Instantaneous Peak Flow	3.0 times ADWF

Figure 4.1-4 (Wastewater Flow Projections to 2030) provides an illustration of the wastewater flow projections from July 2009 to 2030. A copy of the future wastewater flow projection is located in **Appendix 7.7**. As shown in Figure 4.1-3 a treatment capacity of about 0.80 MGD is estimated to be required to meet the development until 2016 and a treatment capacity less than 1.6 MGD will be required by 2030. The City would not be able to accommodate any new connections or additional wastewater flows until the Phase 1 Expansion is constructed. Similarly, the City would not be able to accommodate any connections or additional wastewater flows in excess of 0.8

MGD until Phase 2 is completed. These expansions may be required prior to or later than the approximate dates identified herein, depending on actual growth.

FIGURE 4.1-4: WASTEWATER FLOW PROJECTIONS TO 2030



Presented in Table 4.1-5 (Future Hydraulic Loads) are the hydraulic loads based upon average dry weather flows of 0.8 and 1.6 MGD. Table 4.1-3 (Future Hydraulic Peaking Factors) was used to calculate the peak flows.

TABLE 4.1-5: FUTURE HYDRAULIC LOADS

ADWF (MGD)	Maximum Daily Flow (MGD)	Peak Hourly Flow (MGD)	Instantaneous Peak Flow (MGD)
0.8	1.5	2.0	2.4
1.6	3.0	4.0	4.8

It is anticipated that future organic and solids concentration will be similar in strength to a typical municipal treatment system. Presented in Table 4.1.6 (Future Wastewater Organic and Solids Concentration) are the future daily organic and solids concentrations.

TABLE 4.1-6: FUTURE INFLUENT WASTEWATER ORGANIC AND SOLIDS CONCENTRATION – JULY-OCTOBER 2009

Condition	Average Daily Concentration (mg/L)
Biochemical Oxygen Demand (BOD_5)	280
Suspended Solids (SS)	250

Dry solids (sludge) production per pound of BOD_5 from a typical activated sludge is anticipated to be 0.9 pounds per pound of BOD_5. Table 4.1-7 (Future Daily Organic, Solids Loads, and Solids Production) shows the future daily organic and solids loading based upon the ADWF.

TABLE 4.1-7: FUTURE INFLUENT DAILY ORGANIC, SOLIDS LOADS AND SOLIDS PRODUCTION

ADWF (MGD)	Average Daily Biochemical Oxygen Demand (BOD_5) (ppd)	Average Daily Suspended Solids (SS) (ppd)	Average Daily Solids Production (ppd)
0.8	1,870	1,670	1,500
1.6	3,740	3,340	3,000

4.2 FUTURE DISPOSAL CAPACITY

Disposal of ARSA and Mule Creek State Prison wastewater in the City's secondary WWTP percolation ponds will be discontinued in October 2011. This discontinuation of service will reduce disposal requirements by approximately 0.20 to 0.30 MGD. This corresponds roughly to the loss in capacity by the elimination of Pond 4, and reduced disposal capacity of Ponds 5 and 6 due to the filling of the northern 200 feet.

The disposal capacity of Percolation Ponds 5, 6, and 7 will not be adequate for the immediate planned development. Additional disposal capacity is required. City controlled disposal options are limited, so this Master Plan contemplates construction of an additional percolation pond. Presented in Table 4.2-1 (Future Percolation Pond Capacities and Characteristics) are the revised combined pond characteristics assuming an additional pond, Percolation Pond 8, is built.

The secondary treatment plant water balance for a 100 year precipitation occurrence at an average dry weather flow of 0.8 MGD is contained in **Appendix 7.8**. This balance assumes continued disposal of ARSA water at the Castle Oaks Golf Course but no disposal of ARSA water by use of percolation ponds.

TABLE 4.2-1: FUTURE PERCOLATION POND CAPACITIES AND CHARACTERISTICS

Condition	Units	Ponds 5, 6, 7 and 8
Disposal Capacity (Annual)	MGD	0.80
Gross Area	acres	25.0
Water Surface	acres	17.7
Bottom Surface	acres	15.9
Maximum Water Depth	feet	8 to 14
Storage Volume	million gallons	47.1

The City of Ione requires treatment and disposal facilities to provide wastewater services to the community. These facilities should be planned and built in phases to allow the City to provide these services as growth occurs. Based on flow projections discussed in Section 4, a total treatment and disposal capacity of 1.6 MGD will be needed by 2030 for ADWF condition. The construction of these facilities should be organized such that each construction phase allows for standardization and sizing of equipment and processes. Therefore, the Master Plan proposes two construction phases for wastewater treatment each sized at 0.8 MGD for at total of 1.6 MGD. The Master Plan also proposes a first phase of construction of additional disposal of treated wastewater sized at 0.8 MGD. Descriptions of the proposed phased expansion scenarios are summarized below.

5.1 PHASE I EXPANSION – 0.8 MGD

The first expansion would involve expanding the existing treatment system or constructing a new treatment and disposal system that provides a capacity of 0.8 MGD. This system would accommodate the City of Ione's near-term growth, and would, at a minimum, be sufficient to meet the City's wastewater treatment needs until about 2016-2017. The City would not be able to accommodate any new connections or additional wastewater flows until Phase 1 is constructed. Similarly, the City would not be able to accommodate any connections or additional wastewater flows in excess of 0.8 MGD until Phase 2 is completed. These expansions may be required prior to or later than the approximate dates identified herein, depending on actual growth.

TREATMENT FACILITIES

The existing secondary treatment system involves the use of four aerated treatment ponds (Ponds 1 through 4) and associated operational and non operational facilities and equipment. The treatment system is both outdated and insufficient in size to meet the City's future needs. Therefore, this Master Plan recommends replacement of the aerated treatment pond system with a nutrient removal activated sludge and tertiary treatment system.

The majority of the new treatment system would be constructed immediately south of the existing treatment ponds on the property of the existing secondary WWTP. These facilities would be built outside the boundary of the existing treatment system and would be designed and constructed in a manner which does not interrupt the operation of the existing treatment plant.

At a minimum, the new system would consist of a headworks facility, activated sludge treatment system, biosolids management system, tertiary treatment system, and miscellaneous facilities. A brief description of each is discussed in the following paragraphs.

Headworks Facility

The new headworks facility consisting of a wet well containing multiple submersible influent pumps would collect the City's wastewater. Additional equipment at the headworks would include a screening and washer unit(s), and grit removal and washing system. The screening and grit handling equipment, including disposal containers will be housed in an above ground building. To minimize odors from the screening and grit handling systems, the above ground building will include an odor control system.

Activated Sludge System

The activated sludge system would consist of single or multiple tanks constructed of concrete below ground or partially below ground. This aerobic system would be designed to maintain low dissolved oxygen content and to provide both biological treatment and nutrient removal in the anoxic zones. The rate of flow and aeration would be controlled by an automated system. Monitoring of the dissolved oxygen content will also be automated

A clarifier or decant system will be utilized to separate solids (activated sludge) from the treated effluent. Accumulated solids will be controlled by sending waste activated sludge to the biosolids management system.

Biosolids Management System

The biosolids management system would consist of multiple aerobic digester tanks for digestion and storage of waste activated sludge. The tanks would be constructed of concrete and built below ground or partially below ground. The aerobic digesters would break down and digest the solids generated from the activated sludge system. The sludge produced by this process would then be thickened and dewatered mechanically using a rotary drum thickener, screw press, belt press, or centrifuge and temporarily stored onsite before hauling off site. Dewatering equipment and biosolids storage will be contained in a building. Odor control would be provided for the building.

Tertiary Treatment System

The City is considering two options for the tertiary treatment of wastewater. The first option involves constructing the tertiary treatment system in the same location as the new activated sludge system described above. The second option is to expand the existing City tertiary WWTP, located on the north side of Sutter Creek.

There are potential technical difficulties expanding the existing tertiary treatment plant to meet the Phase II capacity (1.6 MGD plus current capacity of 1.2 MGD). In addition, the City desires to centralize all the new facilities, and leaving the existing tertiary plant available for future expansion provides the City the ability to expand tertiary treatment capacity for water reclamation of water supplied by other agencies such as ARSA. Therefore, it is probable that the tertiary treatment facility would be located adjacent to the new activated sludge system for easier integration. This is the option currently preferred by the City, but no final decision has been determined.

The new tertiary treatment system would consist of filtration and disinfection. The filter system will reduce wastewater turbidity and chemical or ultraviolet radiation (UV) disinfection will destroy any remaining bacteria. The resulting tertiary treated effluent will meet all California Title 22 reuse requirements.

Miscellaneous Facilities

A modern treatment system requires a number of support systems and miscellaneous facilities, such as housing for operations staff and maintenance equipment, laboratory, plant water pumping facilities, area drain pump station, yard piping, utilities, electrical and control systems, emergency power generation and landscaping. These facilities can be contained in a single building or housed in multiple structures. Special consideration during design should be given to the arrangement of these facilities and planning for the Phase II expansion. For example, electrical service and emergency power generation might be sized for the Phase II expansion.

Construction of a pump station and pipeline would be required to pump from the new treatment facilities to the Castle Oaks Golf Course. The pump station would consist of a wetwell containing multiple vertical turbine pumps designed to work in tandem with the existing effluent pumps located at the tertiary treatment plant. The new pipeline would be approximately 10 to 12 inches in diameter and accommodate flow up to 3.0 MGD. Crossing of Sutter Creek would occur on the underside of the bridge. With the exception of the bridge crossing, the new pipeline would be constructed underground and located entirely within City owned land or County roadway right-of-ways.

DISPOSAL FACILITIES

Existing percolation ponds 5, 6, and 7 do not have adequate capacity to meet the Phase I requirement of 0.8 MGD. Therefore, this Master Plan recommends construction of Pond 8. This pond would function similar to existing Ponds 5 through 7 and would be located to the south of Ponds 1 through 4 and west of Pond 7. Pond 8 would be approximately 365 feet by 730 feet in size, with a maximum depth of 10 feet and a maximum water depth of 8 feet in order to maintain a minimum 2 feet of freeboard. Once Pond 8 is constructed and operational, the City would have a disposal capacity of approximately 0.9 MGD. Pond 8 would tie into the existing disposal facilities (Ponds 5 through 7), through an approximately 150 foot long, 12-inch diameter pipeline connecting Pond 7 to Pond 8. This pipeline already exists, and was constructed in 2001 at the same time as Pond 7 in anticipation of the future construction of Pond 8.

Pond 8 would be constructed using a combination of excavated soils and imported soils to create berms that surround and enclose the pond. All water received would be tertiary effluent.

5.2 PHASE II EXPANSION – 1.6 MGD

A second expansion is anticipated to be required to meet future wastewater service obligations. This expansion might be required as early as 2016-2017 but depends upon the rate of development in the City of Ione. Due to the uncertainty of the City's growth, the economy, and regulations, details of any expansions beyond Phase I are not well defined and this Master Plan should be modified to accommodate such changes. However conceptual plans have been developed and are discussed in the following section. No planning level costs have been prepared for the Phase II expansion.

TREATMENT FACILITIES

Treatment facilities for the second expansion would be similar to the Phase I expansion. Essentially all Phase I treatment systems would be mirrored and built immediately adjacent to the Phase I facilities.

DISPOSAL FACILITIES

Additional effluent disposal will be required for the Phase II expansion. The City believes that disposal can be accomplished through expansion of water reclamation services to new customers, seasonal storage, and additional percolation ponds. The details of these disposal options are not well defined and are subject to change, but are briefly discussed below.

Additional planning will be required before implementation of the Phase II disposal systems and the City plans to develop a future Recycled Water Distribution System Master Plan.

Construction of Pond 9

This disposal option would involve the construction of Pond 9. The pond would be located north of Sutter Creek immediately west of the COWRP. Pond 9 would have the dimensions and operate similar to Pond 8 described above. Disposal capacity through percolation and evaporation of Pond 9 is anticipated to range from 0.3 to 0.5 MGD.

Water Reclamation at Charles Howard Park and Unimin Mine

Charles Howard Park and Unimin Mine have been identified by the City of Ione as potential end users of the City's Title 22 reclaimed wastewater. Since Charles Howard Park is owned and operated by the City of Ione, the City has full control of the park's irrigation needs. Unimin Mine, however, is a privately owned corporation, and the City has not yet reached an agreement with Unimin Mine that would allow the City to dispose of its Title 22 reclaimed water at the Unimin Mine property. In addition, Unimin Mine's water needs are currently being met by the AWA, which supplies raw water to Unimin Mine and a number of other water users in the Ione area. The AWA has indicated that it plans on terminating raw water service to the Ione area as soon as the year 2011, which would allow an opportunity for Ione to replace the raw water needs for Unimin Mine and other water users with the City's reclaimed water. However, should the AWA ultimately decide to not terminate its supply of raw water to Unimin Mine, then it is unlikely that the City will be able to negotiate a reclaimed water disposal contract with Unimin Mine. In addition, the mining operation operates under a permit from the RWQCB; therefore use of reclaimed wastewater would likely require revision to that permit.

Charles Howard Park uses approximately 50 acre-feet (16.3 million gallons) of water annually for irrigation purposes, predominantly during the drier, warmer months, with daily demands of 0.1 to 0.3 MGD. The park currently uses raw water supplied by AWA for this purpose.

Unimin Mine currently uses approximately 350 acre-feet (between 0.40 and 0.55 million gallons per day) of water annually in its mining operations. The mine currently uses raw water supplied by AWA to convey mineral slurries and wash-finished silica product. After use, the used raw water is captured into the various cache basins and ponds on the site and allowed to percolate naturally into the ground. Unlike other potential end users Unimin Mine operates year round, and thus the mine's need for water does not fluctuate with the seasons. This quality makes Unimin Mine a very desirable end user for the City of Ione's reclaimed wastewater, as the mine's year round operations would reduce the City's need to seasonally store wastewater during the wet winter months or to use percolation ponds for disposal.

Providing reclaimed water to these two end users would provide the City with a minimum of 0.40 MGD of disposal capacity during the wet winter months and up to 0.58 MGD of disposal capacity in the warm summer months.

In order to provide Charles Howard Park and Unimin Mine with Title 22 reclaimed wastewater, the City of Ione would need to construct pipelines to reach both of these potential end users. A total of six potential pipeline routes have been identified by the City. Ultimately, the chosen pipeline route will depend on factors such as right-of-way access, construction costs, and environmental impacts. All six pipeline routes identified thus far would require the cooperation of Caltrans and the County to allow construction of a new underground pipeline to be located within a road or highway right-of-way. Shown in Figures 2.5-6 through 2.5-11 contained in the project EIR are the six pipeline routes.

Pipeline Route 1

The first pipeline route, EIR Figure 2.5-6 (Potential Pipeline Route #1), option would begin at the new treatment facility, and then continue south on Old Stockton Road then east along an existing dirt road that serves as a back entrance to the Unimin Mine property. From the Unimin Mine back gate, the route would continue generally southeast to the Unimin Mine raw water holding pond. From the water holding pond on the Unimin Mine site, the pipeline route would continue east and northeast within the main driveway entrance to Unimin Mine. At the intersection of the Unimin Mine driveway and SR 124, the pipeline route would continue north within the SR 124 right of way. The pipeline route would then travel east along the southern driveway entrance to Charles Howard Park and would follow this dirt roadway until reaching the irrigation water holding pond on the park site.

Pipeline Route 2

The second pipeline route, EIR Figure 2.5-7 (Potential Pipeline Route #2), option would begin at the facility, head south through the WWTP, and continue south through an agricultural field. This segment parallels the existing South Valley Trunk Line, one of the pipelines that deliver untreated effluent to the existing City's secondary WWTP. Where this segment intersects the Union Pacific Railroad right-of-way, the pipeline route would turn east and continue within the railroad right-of-way. Along the railroad right-of-way, an abandoned railroad spur branches off the main rail line. At this railroad spur, the pipeline would travel southwest along the spur right-of-way until connection to an existing roadway. The pipeline would then follow this roadway, where it would arrive at the back gate to the Unimin Mine property. From the back gate of the Unimin Mine property, pipeline route 2 would be identical to pipeline route 1.

Pipeline Route 3

The third pipeline route, EIR Figure 2.5-8 (Potential Pipeline Route #3), option would begin at the new treatment facility, head north through and travel east along West Marlette Street. The route would then turn south along an existing unnamed roadway, where it would intersect the Union Pacific Railroad right-of-way. The pipeline route would then travel west until reaching the railroad spur that heads southwest toward the Unimin Mine property. At this railroad spur, the pipeline route would be identical to pipeline route 2.

Pipeline Route 4

The fourth pipeline route, EIR Figure 2.5-9 (Potential Pipeline Route #4), option would begin the same way as pipeline route 2, but would continue traveling east for the entire length of West Marlette Street. At the terminus of West Marlette Street, the pipeline would travel north within the South Buena Vista Street right-of-way for one block, and then travel east on Market Street for one block. At the intersection of Market Street and Church Street/Highway 124, the pipeline would travel south in the Church Street/Highway 124 right-of-way.

At the intersection with the northern of the two entrance driveways into Charles Howard Park, the pipeline would split into two lines. The eastern line would travel up the Charles Howard Park driveway and then terminate in the irrigation water holding pond located near the southeast corner of the park site. The western line would continue south within the right-of-way for SR 124, and then would continue west along the roadway entrance to the Unimin Mine property before terminating at the Unimin Mine raw water holding pond.

Pipeline Route 5

The fifth pipeline route, EIR Figure 2.5-10 (Potential Pipeline Route #5), option is nearly identical to pipeline route 4. The exception is the location of the split into the eastern and western pipelines that would access the park and the mine, respectively. Instead of splitting at the northern driveway entrance to the park, pipeline route 5 would split at the southern driveway entrance. The eastern pipeline would then travel east along the southern driveway to the irrigation water holding pond, while the western route would continue to Unimin Mine as described in pipeline route 4.

Pipeline Route 6

The first half of the sixth pipeline route , EIR Figure 2.5-11 (Potential Pipeline Route #6), option would be identical to pipeline route 4, traveling east on West Marlette Street, north on South Buena Vista Street, and then east on West Market Street. Instead of only going east for one block on West Market Street, pipeline route 6 would travel east for two blocks before continuing south and southeast on Foothill Blvd/SR 104.

Pipeline route 6 would travel south and southeast on SR. The proposed pipeline would intersect an existing 12-inch, raw water pipeline owned by Unimin Mine. The proposed pipeline would tie into this existing pipeline, which travels west and south through the Wildflower Subdivision and terminate in the irrigation water holding pond located near the southeast corner of the Charles Howard Park.

From the park's irrigation water holding pond, the proposed pipeline would travel west along the southern driveway entrance to Charles Howard Park. At the driveway intersection with SR 124, the pipeline route would then travel south within the SR 124 right-of-way, and then west along the main entrance to Unimin Mine before terminating at the Unimin Mine raw water holding pond.

Other Reclamation Locations

The City is also exploring the supply of reclaimed wastewater to the Preston Youth Facility, irrigation to open spaces and parks, cemeteries, recreation areas and agricultural/pastoral lands. Regardless of the end user, conveyance of the reclaimed wastewater would likely require construction of one or more new pipelines. The size and route of any new pipeline(s) would be dependent on the needs and location of the end user. Disposal capacity of these additional uses is also not known.

Preston Reservoir

The Preston Reservoir is located north of the Preston Youth Facility and east of the Mule Creek State Prison and is owned by the State of California. The Preston Reservoir has a storage capacity of 235 acre-feet and a percolation and evaporation capacity of approximately 163 acre-feet per year. The Preston Reservoir receives secondary treated effluent from the Mule Creek State Prison, ARSA and backwash water from the Preston Youth Facility Water Treatment Plant when in operation. ARSA also diverts some raw water from Sutter Creek to the reservoir each year in order to maintain water rights. The reservoir's entire storage capacity has been allocated between these three users. Currently, no additional capacity is available for other users.

Storage capacity may be available at the Preston Reservoir in the future, particularly if ARSA terminates sending any of its wastewater to the Ione treatment and disposal system or the State no longer allows ARSA access to the lower system. Should capacity be available in the future, the City of Ione would have the opportunity to use Preston Reservoir for the storage of treated wastewater. The amount of storage capacity that could be available to the City is unknown at this time, and would require negotiations with the State of California.

The City would need to construct a pipeline to the Preston Reservoir in order to use the reservoir for wastewater storage. A pipeline route to the reservoir has not been identified at this time, but would likely involve the extension of the City's existing 10-inch diameter pipeline that currently carries tertiary effluent from the existing City's tertiary WWTP to the Castle Oaks Golf Course. In the event that the City is able to use Preston Reservoir for wastewater storage, the City could send tertiary effluent through this extended pipeline. The existing State-owned, 12-inch diameter pipeline that currently delivers ARSA secondary treated wastewater to the existing tertiary WWTP could potentially be used to bring stored wastewater back from the reservoir to the tertiary WWTP for retreatment, if required, and eventual disposal. Reuse of the pipeline would require negotiations with the State of California.

Ione Water Reservoir

The AWA owns the Ione Water Reservoir located approximately 0.25 miles east of the City of Ione. This reservoir has a capacity of approximately 27 acre-feet and is currently used by the AWA for the storage of raw water for the City of Ione. The AWA has stated its intention to terminate the supply of raw water to users in the City of Ione. If this termination occurs, the City could have the opportunity to take over the use of both the Ione Water Reservoir, as well as several of AWA's existing pipeline infrastructures. The City could then use a combination of new pipelines and AWA's existing pipelines to bring treated wastewater to and from the City's treatment facilities, while using the Ione Water Reservoir for seasonal or year-round storage of treated wastewater.

Other Water Reservoirs

No other existing storage reservoirs have been currently identified in the immediate area that could be used in the future for the City's wastewater storage needs. However, if the City determines that additional storage capacity beyond that identified in this Master Plan is required, the City may investigate the construction of one or more reservoirs to store reclaimed wastewater or use the use of an existing reservoir currently not identified. The size and location of such additional reservoirs is unknown at this time.

5.3 MASTER PLAN RECOMMENDED PROJECT – PHASE I AND PHASE II

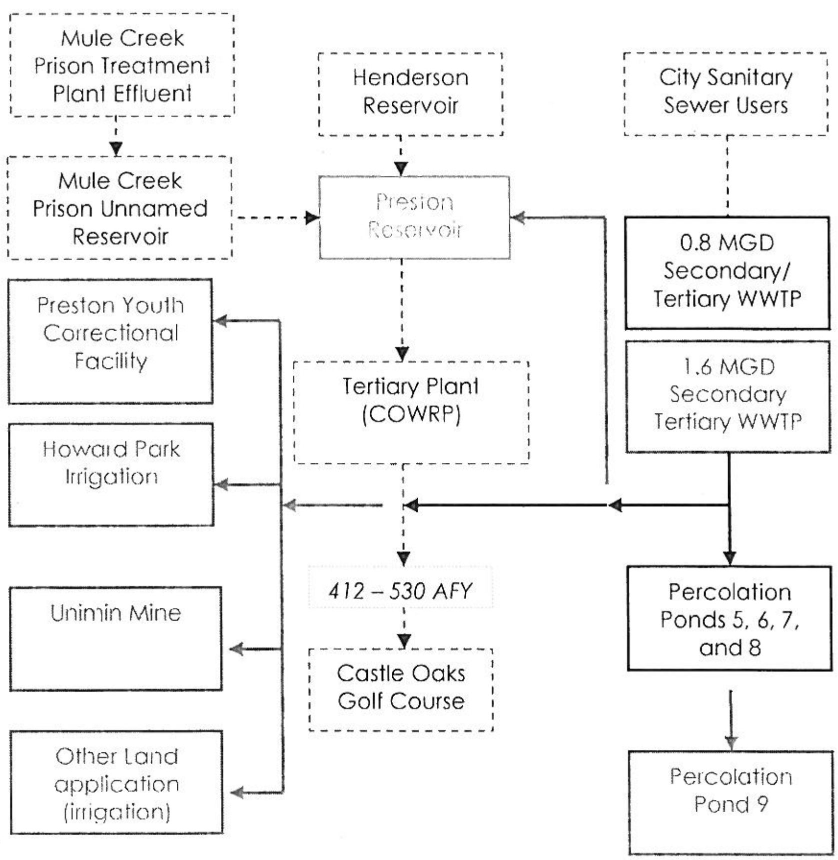
The City does not have need, ability, or adequate financial capacity to construct all treatment, disposal and storage facilities for the projected ultimate demand in 2030. Instead it is recommended that the facilities be constructed in phases in anticipation of growth. Due to the uncertainty of the City's growth and changes, details of any expansions beyond Phase I are not well defined and this Master Plan should be modified to accommodate such changes.

The first expansion (Phase I) would include additional treatment facilities similar to Phase I, as well as additional disposal capacity. A summary of the proposed Phase II recommendations is provided below and detailed discussions of each can be found in the previous paragraphs.

- Treatment facilities similar to Phase I
- Biosolids management system, including aerated sludge treatment system, a dewatering system, and dry solids storage and hauling site
- Miscellaneous facilities, including operations building, electrical building, emergency power generation system, and landscaping
- Tertiary treatment system, including filtration and disinfection
- Percolation Pond 8
- Pump station and pipeline that connects to the existing effluent line to the Castle Oaks Golf Course to allow tertiary effluent to be sent directly to the golf course from the new treatment facility

Figure 5.3-1 (Recommended Project Flow Diagram) shows the relationship of the new facilities to be built both in Phase I and Phase II to the existing treatment facilities. Potential future project elements (Phase II) are shown in green.

FIGURE 5.3-1: RECOMMENDED PROJECT FLOW DIAGRAM



PHASE I PLANNING LEVEL COST ESTIMATE

Planning level costs for the Phase I Expansion is shown in Table 5.3-1 (Phase I Project Planning Level Cost Estimate). Phase II costs are not defined. The costs presenled in Table 5.3-1 (Phase I Project Planning Level Cost Estimate) anticipate construction of the new facilities by a Design-Build contract in 2010-2011 and do not include the cost of current planning efforts or administration costs by the City associated with the Design-Build contract. A breakdown of project element costs is contained in **Appendix 7.9.**

TABLE 5.3-1: PHASE I PROJECT PLANNING LEVEL COST ESTIMATE

Project Element	Description	Planning Level Cost	
		Minimum	Maximum
1	Construction of a new 0.8 MGD nutrient removal and tertiary treatment system, including influent pumps, screening equipment , grit removal, aerated sludge treatment system, dewatering system, dry solids storage, tertiary filtration, disinfection, operations building, maintenance yard, electrical building, emergency power generation system, and landscaping	$7,810,000	$10,160,000
2	Elimination of Ponds 1 through 4 and the filling of the northern edge of Ponds 5 and 6	$810,000	$1,050,000
3	Construction of a new effluent pump station and pipeline crossing Sutter Creek for connection to the existing City tertiary WWTP effluent pump station	$910,000	$1,150,000
4	Construction of Percolation Pond 8	$720,000	$930,000
Total Probable Project Cost		**$10,250,000**	**$13,320,000**

6.1 WORKS CITED

ECO:LOGIC Engineering. June, 2006. *Initial Study/Mitigated Negative Declaration for the Wastewater Treatment Facility Improvement Project.* Ione, California.

LEE & RO, Inc. 4 October 2007. *City of Ione Technical Memorandum: Wastewater Treatment and Disposal.* Ione, California.

RMT, Inc. February, 2009. Project Description for the Ione WWTP Master Plan Administrative Draft EIR. Ione, California.

6.2 OTHER DOCUMENTS

ECO:LOGIC Engineering. November, 2004. *City of Ione Wastewater Treatment Plan Master Plan.* Ione, California

MHA I RMT. 26 November 2008. *Notice of Preparation for a Program and Project-Specific Environmental Impact Report for the City of Ione Wastewater Master Plan.* Ione, California.